Below is a listing of the claims that will replace all prior versions and listings of claims in the present patent application.

Listing of Claims:

[c1]1. (Currently Amended) A digital tomosynthesis system adapted to acquire a plurality of projection radiographs of an object and comprising:

an x-ray source adapted to emit a beam of x-rays;

a digital detector disposed in a spatial relationship to the x-ray source relative to the object; and

a processor coupled to said x-ray source and said detector adapted to control said x-ray source and process data received from said detector such that projection radiographs are acquired at different positions of the focal spot of the x-ray source relative to said object along a linear trajectory of the x-ray source, wherein the x-ray source moves in a trajectory at a constant distance from the detector.

[c2]2. (Cancelled)

[c3]3. (Original) The digital tomosynthesis system as in claim 1, wherein the detector comprises rows of pixels and the columns of pixels configured in a grid, and the x-ray source moves in a trajectory parallel to either one of the rows or the columns.

[c4]4. (Original) The digital tomosynthesis system as in claim 1, wherein the focal spot of the x-ray source is provided at a plurality of positions located in a plane parallel to the detector.

[c5]5. (Original) The digital tomosynthesis system as in claim 3, wherein for each of the rows or columns of pixels there is a uniquely defined. plane in 3-dimensional space such that for any focal spot position of the x-ray source on the trajectory, structures of the object in the plane are projected onto either one of the pixel rows or columns.

[c6]6. (Original) The digital tomosynthesis system as in claim 1 wherein said detector comprises pixels organized into rows and columns, wherein a focal spot of the x-ray source moves relative to the detector in a linear trajectory parallel to one of either the rows of pixels or the columns of pixels.

[c7]7. (Original) The digital tomosynthesis system as in claim 1, wherein the processor further independently reconstructs 3-dimensional structures provided in logical planes of an object by computing 2-dimensional reconstructions of information about the structures in said planes of said object from information provided in the acquired projection radiographs.

[c8]8. (Original) A digital tomosynthesis system as in claim 7, wherein the 2-dimensional reconstructions are assembled to form a 3-dimensional volumetric reconstruction of the object.

[c9]9. (Original) A digital tomosynthesis system as in claim 8, wherein the focal spot positions of the x-ray source are located at a constant height above the detector, and wherein the 2-dimensional reconstructions are computed by determining mathematical relationships between Fourier Transforms of logical slices through the object with Fourier Transforms of projection images of the object.

[c10]10. (Original) The digital tomosynthesis system as in claim 1, wherein reconstructed 3-dimensional information is determined based upon interpolated, one-dimensional functions.

[c11]11. (Original) The digital tomosynthesis system as in claim 4, wherein reconstructed 3-dimensional information is determined based upon interpolated, one-dimensional functions.

[c12]12. (Original) The digital tomosynthesis system as in claim 4, wherein the structures of the object at a height are decomposed into linear combinations of sinusoidal structures, said sinusoidal structures corresponding to different heights within the object being superimposed in the projection radiographs, and said structures of the object being reconstructed based upon the projection radiographs.

[c13]13. (Original) The digital tomosynthesis system as in claim 12, wherein each sinusoidal structure at each height produces a sinusoidal structure in the projection image, and for different positions of the focal spot of the x-ray source, the frequency of the sinusoidal structure in the projection image remains constant and the phase shift of the sinusoidal structure in the projection image varies based on the different positions of the focal spot of the x-ray source and the height of the sinusoidal structure, said sinusoidal structures at different heights being reconstructed from the sinusoidal structures within the projection images.

[c14]14. (Original) The digital tomosynthesis system as in claim 5, wherein reconstructed 3-dimensional information is determined based upon interpolated, one-dimensional functions.

[c15]15. (Currently Amended) A method of digital tomosynthesis using a system having an x-ray source and a digital detector, comprising:

using the detector to acquire projection radiographs of an object based on x-ray beams emitted by the x-ray source; and

controlling said x-ray source and processing data received from said detector such that projection radiographs are acquired at different positions of a focal spot of the x-ray source relative to said detector along a linear trajectory of the x-ray source, wherein the x-ray source moves in a linear trajectory located at a constant distance from the detector.

[c16]16. (Cancelled)

[c17]17. (Cancelled)

[c18]18. (Original) The method as in claim 15, wherein the x-ray source moves in a linear trajectory relative to and parallel to either rows of pixels or columns of pixels provided in the detector.

[c19]19. (Original) The method as in claim 15, further comprising:

providing the focal spot of the x-ray source at a plurality of positions located in a plane parallel to the detector.

[c20]20. (Original) The method as in claim 18, wherein for each of the rows or columns of pixels there is a uniquely defined, plane in 3-dimensional space such that for any focal spot position of the x-ray source on the trajectory, structures of the object in the plane are projected onto said pixel row or column, and a 3-dimensional image of the structures of the object is reconstructed from the projections onto either one of the pixel rows or columns.

[c21]21. (Original) The method as in claim 18, further comprising:

reconstructing independently 3-dimensional structures provided in planes of an object by computing 2-dimensional reconstructions of information about the structures in said planes of said object from information provided in the acquired projection radiographs.

[c22]22. (Original) The method as in claim 21, further comprising:

assembling the 2-dimensional reconstructions to form a 3-dimensional volumetric reconstruction of the object.

[c23]23. (Original) The method as in claim 15, further comprising:

decomposing the structures of the object at a height into linear combinations of sinusoidal structures, said sinusoidal structures corresponding to different heights within the object being superimposed in the projection radiographs, and said structures of the object being reconstructed based upon the projection radiographs.

[c24]24. (Original) The method as in claim 23, further comprising:

producing by each sinusoidal structure at each height a sinusoidal structure in the projection image, and for different positions of the focal spot of the x-ray source, the frequency of the sinusoidal structure in the projection image remains constant and the phase shift of the sinusoidal structure in the projection image varies based on the different positions of the focal spot of the x-ray source and the height of the sinusoidal structure, said sinusoidal structures at different heights being reconstructed from the sinusoidal structures within the projection images.

[c25]25. (Original) The method as in claim 20, further comprising:

determining the reconstructed 3-dimensional information based upon one-dimensional functions.